CLAIMS

What is claimed is:

1. A preload shock absorber assembly comprising:

a shock absorber having a hydraulic cylinder; and

first, second and third springs arranged outside of said hydraulic cylinder, said first spring having a compressible fluid providing a first spring rate, said second spring arranged axially from said first spring, and said third spring arranged at least partially coaxially to said first spring.

2. The assembly according to claim 1, wherein said shock absorber includes a cylinder head at one end of said hydraulic cylinder slideably supporting a rod with a seal between said rod and said cylinder head, and a cavity adjacent to said seal and radially inward of said first spring, said cavity at approximately atmospheric pressure in a static condition.

3. The assembly according to claim 2, wherein said first spring is arranged radially outward of said hydraulic cylinder.

4. The assembly according to claim 1, wherein said first spring is provided by walls forming a pressurized, sealed air chamber, and said third spring arranged in said air chamber.

5. The assembly according to claim 4, wherein an axially movable separator provides one of said walls, said separator arranged axially between said first and second springs.

6. The assembly according to claim 5, wherein said second spring is supported between said separator and a seat secured to said hydraulic cylinder.

7. The assembly according to claim 4, wherein said air chamber is arranged radially outwardly from a rod seal slideably supporting a rod of said hydraulic cylinder.

8. A preload shock absorber assembly comprising:

a shock absorber having a hydraulic cylinder with a seat secured to an outer wall of said cylinder;

a preload air chamber having a pressurized compressible fluid with said air chamber arranged radially outwardly of said outer wall of said hydraulic cylinder; and

a second spring arranged between said air chamber and said seat.

9. The assembly according to claim 8, wherein a third spring is arranged within said air chamber.

10. The assembly according to claim 9, wherein said air chamber includes an axially movable separator, and said pressurized air and said third spring exerting a preload on said second spring.

11. A preload shock absorber assembly comprising:

a shock absorber having a hydraulic cylinder with an outer wall;

an air chamber providing a first spring rate arranged radially outwardly from said outer wall; and

a mechanical spring arranged within said air chamber providing a second spring rate supplementing said first spring rate.

12. The assembly according to claim 11, wherein a seat is secured to said outer wall, and a second spring is arranged between said seat and said air chamber.

13. The assembly according to claim 11, wherein said air chamber includes an axially movable separator arranged between said mechanical spring and said second spring with said first spring rate and said second spring rate exerting a force on said second spring.